

SECTION THREE

COMPLIANCE REQUIREMENTS AND REGULATORY IMPACTS

This section forecasts the costs and market impacts of FDA regulatory options for regulating animal production, slaughtering, rendering, and feeding. Animal producers, slaughterers, renderers, and animal feed manufacturers will be impacted to varying degrees. These estimated impacts are distributed among sectors based on forecasts of industry and market responses to potential FDA regulatory actions.

3.1 ESTIMATES OF ESTABLISHMENTS AND QUANTITIES OF RUMINANT OFFAL COVERED BY THE REGULATION

Table 3-1 presents estimates of the numbers of establishments in various industries affected by the regulatory options under consideration. Many of the categories of establishments, such as slaughterhouses, have been subdivided to include specific categories of particular interest, such as cattle packers. While all of the categories of establishments included in Table 3-1 are affected in some way by the regulatory options, not all categories appear in all of the cost estimation tables.

Tables 3-2 through 3-5 present estimates of the quantities of animal offal (and rendered animal protein) to be prohibited from use in ruminant feed under each of the regulatory options. The mammalian prohibition affects the marketing of meat and bone meal (MBM) derived from an estimated 146 million head processed annually.¹ The ruminant and the partial ruminant prohibitions affect the marketing of MBM manufactured from the offal of an estimated 49 million head processed annually. The prohibitions focussed on (1) sheep, lamb, deer, elk, and mink (referred to for convenience as the sheep/mink prohibition) and on (2) sheep and goat only will affect far fewer animals.

The quantity of MBM directly prohibited from ruminant feed declines across the range of options under consideration. The mammalian prohibition restricts use of slightly more protein than

¹The count of animals is not comprehensive because the number of deer slaughtered per year could not be estimated in a reliable fashion.

the ruminant prohibition. The partial ruminant option restricts use of substantially less material, with coverage equivalent to only 15 percent of the mammalian prohibition and 21 percent of the ruminant prohibition. As will be described, however, independent renderers are not expected to separate restricted from unrestricted protein materials in manufacturing mixed species MBM under any of the first three regulatory options. Where cattle protein is restricted, virtually all of the animal protein processed by independent renderers will become restricted. For example, offal from chicken and other nonregulated species that are processed by independent renderers are included in the mixed species MBM they produce. The quantities of these other animal proteins have been added to MBM totals as appropriate and used in calculating the market impacts introduced later.

With regard to the partial ruminant option, it was assumed that the restricted material can be effectively separated from the remainder of the slaughtered animal. This assumption affects the assumed quantity of MBM affected by this option. There is, however, uncertainty about the efficacy of separation techniques during slaughter for most components of the restricted material. Specifically, some slaughterers and renderers have commented that not all brain tissue gets removed while harvesting the brain. Research in the United Kingdom has also suggested that the entire backbone of the cow might need to be removed, rather than just the spinal cord, to ensure that all potentially infectious tissue is removed. The removal of the backbone will also reduce the yield from the carcass. Finally, FDA continues to study the appropriate requirements for removal of the distal ileum. If FDA chooses the partial ruminant prohibition, its final requirements for separation might necessitate removal of substantially more cattle tissue than has been assumed here. To the extent more tissue must be removed, it will increase the regulatory impacts of this prohibition. Under the most stringent removal requirements likely, the amount of cattle protein subject to the prohibition could be substantially higher than the estimates used here, whereas other components of the estimates, such as dead stock, are unchanged. This change would increase the overall total of MBM prohibited from ruminant feed under this option.

In the options focussing on sheep and goat protein, renderers are expected to exclude the restricted materials from their rendering processes so that their entire production of mixed species MBM does not fall under marketing restrictions. Thus, independent renderers will refuse pickups of restricted offal, leaving animal producers or their slaughterers to dispose of the animal offal by other means. Much sheep and goat offal, however, is rendered separately for use in pet foods or in other nonrestricted uses. These separate sheep and goat offal rendering operations will continue without change under all regulatory options. Additionally, nearly all of the remaining sheep and

goat offal is already being excluded from rendering for mixed species MBM production by voluntary industry actions. Table 3-5 accounts for these existing patterns by showing estimates of the share of sheep, lamb, goat, deer, and mink offal that is rendered for mixed species MBM. These estimates were based on contacts with animal producers, renderers with knowledge in these areas, and a project consultant. These estimates are quite approximate due to the lack of survey or market data on which to base these estimates. It is widely believed, however, that very little sheep, lamb, or goat is currently being rendered for mixed species MBM.

3.2 COMPLIANCE COSTS FOR THE MAMMALIAN-TO-RUMINANT PROHIBITION

3.2.1 Capital Costs

Under the mammalian prohibition, all protein from ruminant and nonruminant offal is restricted from ruminant feed. Animal packer/renderers, slaughterers, and independent renderers must decide whether to modify their facilities and operations to separate the collection and processing of mammalian and nonruminant offal and/or to cease marketing their product for use in ruminant feed.

Under the mammalian prohibition, possible separation of offal by species will not be of any interest to packer/renderers or large slaughterers. The offal from cattle and hog slaughterers (as well as that from sheep, lamb, goat, etc.) can continue to be used in MBM, but the MBM product cannot be sold for feed to cattle or other ruminants. The only possible interest in separation of offal will occur for slaughterers that process mammals (e.g., hogs or cattle) and non-mammals (e.g., poultry). Slaughtering operations are virtually all sufficiently specialized, however, that a negligible number of facilities fall into this category.

Similarly, locker plants and independent renderers will have no reason to separate offal. Both groups handle very limited amounts of nonmammalian offal so separation of offal will have little economic benefit.

Feedmills will also consider facility modifications to allow joint production of feeds for ruminants and nonruminants. To continue supplying feed for both ruminants and nonruminants, many feedmills will have to modify their facilities. They might expand their capacity to allow

handling of different protein sources such as corn gluten meal, blood meal, poultry feather meal, or fish meal. Whether a feedmill can expand its range of feed supplies with their current facility is determined largely by the availability of storage bins to handle a working inventory of another feed component and whether they are currently handling these other protein sources in their feed mixes. The feedmill response will also vary significantly by region, depending on the price and availability of protein alternatives in each region and the type of rations being produced.

Based on discussions with feedmill operators, a number of feedmills are expected to add bins in response to a mammalian prohibition. The feedmills are expected to make this investment without particular regard for the effect of the regulation on the price of MBM. This contrasts with the estimate for the ruminant prohibition (to be discussed) under which it is judged that feedmills will resist investments in additional bins until the price differential between ruminant-derived MBM and nonruminant-derived MBM products became significant, perhaps \$50 per ton or more. In the mammalian case, feedmills that wish to continue to service ruminant and nonruminant producers (such as some feedmills in dairy areas) will need to add feed ingredient capacity. The cost of the capital investment required is estimated at \$50,000 per feedmill, which covers the cost to add a storage bin sufficient to store approximately one and one-half truckloads of a protein alternative.

The capital costs are applied to 20 percent of the major commercial feedmills, or 1,000 of the estimated 5,000 major feedmills. No equipment investments were forecast for 25,000 smaller feedmills and retail feed dealers included in the estimated 30,000 operating feedmills. Those not investing in additional storage bins include feedmills that specialize in feeds for either ruminant or nonruminant species and do not need to expand their feed capabilities, feedmills that have ample bin storage capacity now to accommodate additional ingredients, and feedmills or feed dealers that are too small to handle MBM at the present time (and that, therefore, do not mix in MBM into their current lines of feed). Because the customer constituencies and the size distribution of the feedmills represented in this population are not known, these feedmill estimates are associated with a wide margin of uncertainty.

Feedmill nutritionists will also spend time to reformulate the affected feed mixes. Under the mammalian option, feedmills must recalculate the optimum feed mixes for those ruminant feeds that now include any type of MBM. The nutritionists will restructure the computer-based calculations to select among other protein sources, taking into account relative nutritional contributions, other feed characteristics, and input prices. Nutritionists are estimated to require a

few hours per formulation to adjust the input mixes. Tables 3-6a and 3-6b describe the costs of reformulating feed mixes.

Feedmills may also be required to reregister modified ruminant feeds with state agricultural agencies. Tables 3-6a and 3-6b present the calculations needed to derive product reregistration costs. Many states require manufacturers to register each feed product they sell, although a number of states have switched to a feedmill licensing procedure that does not require registration of each product. Those states that require product registrations typically also require reregistrations on a 1- to 3-year cycle. While the effort required for each state reregistration of a product is modest, estimated here at less than an hour per state per product, the number of reformulated products and the number of states with registration requirements could create a substantial administrative cost for feedmills.

At the time this report was prepared, however, it remained uncertain whether most states would require reregistration of the reformulated feed mixes. Some observers predicted that the reformulations would be considered within the specifications of the original product and, therefore, not subject to reregistration. Furthermore, state agricultural agencies have not yet reached agreement on how product labels and registration data should be modified. As shown in Table 3-6b, it was assumed that most (75 percent) of the possible reregistration requirements will not be necessary (see Table 3-6b). Nevertheless, given the uncertainty about the eventual registration requirements, the cost estimates for state reregistration requirements should be considered speculative.

The state registration requirements will also create a recurring annual cost for feedmills. To comply with the mammalian prohibition while maintaining as much of its customer base as possible, feedmills are expected to create some new feed mixes, thus expanding the number of products manufactured. These additional products will be subject to the state reregistration cycles and will generate additional recurring costs over time. The proportion of reregistered products that constitute additional (rather than substitute) products was estimated at 25, 15, 10, and 5 percent for the different size feed manufacturers.

3.2.2 Incremental Operating Costs at Affected Facilities

Because slaughterers and renderers are expected to continue current operations without change, they will not incur incremental operating costs.

Feedmills will incur incremental annual operating costs to avoid contamination of cattle feed with mammalian MBM. The incremental annual operating costs are estimated at \$10,000 (See Table 3-6a; Hershberger, 1996). This estimate is derived from comments made by the National Grain and Feed Association (NGFA), a trade organization representing feedmills, to the FDA docket for this rulemaking. The costs encompass the time needed to run cleanout and flushing procedures between feed batches, as may be appropriate, and to sequence the feed runs according to MBM type. In general, the additional sequencing and flushing of the feedmill equipment could interrupt feed manufacturing for several minutes several times per day. The NGFA estimate was the only available estimate of these incremental operating costs and was accepted for this analysis. The same costs defined for the mammalian prohibition (\$10,000 per year) were applied in this case for the additional work activities needed to ensure that contamination does not occur (covering the time needed to run cleanout and flushing procedures between feed batches and to sequence the feed runs according to feed type).

3.2.3 Incremental Transportation Costs

Transportation costs increase to the extent that offal is shipped greater distances or is collected less efficiently, such as in smaller quantities per stop for independent rendering trucks. Because slaughtering and rendering production operations will not be changed, however, the transportation patterns for offal will not change, and no incremental transportation costs for processing have been estimated.

Renderers will incur increased transportation charges, however, to sell mixed species MBM after the mammalian prohibition is implemented. Because some traditional nearby markets for this material are eliminated, renderers will be compelled to ship some of their product longer distances to new buyers. The additional transportation distance and the mode of transportation will vary widely. Transportation charges will also be one influence on the size of the price decline for MBM, and will be correlated with the size of the price decline. That is, higher transportation charges will be correlated with larger price declines. Although the incremental transportation requirements cannot be predicted with accuracy, an average incremental transportation charge of \$25 per ton was applied to all of the displaced MBM. Cattle currently consume approximately 10

percent of the mixed species MBM produced or slightly more than 610 million lbs of MBM (Bisplinghoff, 1996). This generates an incremental cost of \$7.6 million per year.

Further, the transportation costs reflected in feed prices will increase as MBM is replaced with other protein sources. This effect is considered more significant in the mammalian prohibition because feedmill alternatives for supplying bypass protein to ruminants are reduced more than in other cases. The regulation-based constraints on protein sources will compel feed manufacturers to draw from more costly sources (i.e., sources that would not otherwise be selected), and in some cases, these price differentials will reflect longer transportation distances to the feedmill. Assuming average incremental costs for feed replacement of \$10 per ton of MBM (i.e., calculating the incremental transportation cost in terms of the material being replaced), the incremental transportation cost is calculated at \$3.1 million per year.

3.2.4 Documentation Costs

FDA has defined a basic set of documentation and recordkeeping requirements on the agricultural industries to establish compliance with TSE control regulation. The documentation requirements begin at the point of rendering and end with requirements for ruminant animal producers. Unit costs applicable to documentation tasks are presented in Table 3-7 and aggregate documentation costs in Table 3-8.

FDA has specified that the TSE regulation will contain two general requirements on persons that manufacture, blend, process, and distribute animal protein products and feeds made from such products:

- # Place cautionary labeling on the protein and feed products, and
- # Provide FDA with access to sales and purchase invoices.

Thus, the following activities are required for the following industries:

- # Renderers will:
 - Provide precautionary labeling on their restricted MBM products;

Maintain copies of MBM sales invoices (and make them available to FDA if so requested).

Feed manufacturers and others distributing feed products, including protein blenders will:

Provide precautionary labeling on their restricted MBM products;

Maintain copies of sales invoices (and make them available to FDA if so requested).

Maintain copies of purchase invoices for animal protein products used in feed manufacturing.

Labeling costs will generally be accomplished by modification of printed invoice forms or computer-generated invoices and sales documentation. Simple stickers with the warning language might be used, at least as a temporary measure, to address the labeling change. It was estimated that some incremental costs will be incurred by renderers and feedmills to revise their labeling and to ensure that the corrected labels comply with FDA requirements.

Based on the estimated number of reformulated products derived in Table 3-6b, approximately 4,400 mills will be reformulating products. Nevertheless, numerous additional mills, such as those that use ruminant MBM in nonruminant feeds, will revise their labeling to include the required warning language even though such products will not need to be reformulated. The number of feedmills modifying their ruminant feed labels was estimated at 10,000.

Beyond this initial labor cost to change labels, however, no additional incremental labeling costs are foreseen. In general, it was assumed that the requisite warning language could be incorporated onto printed labels and/or other sales documentation without an incremental printing charge. It was also assumed that the implementation period for the FDA regulation would be long enough to allow companies to exhaust any existing inventory of labels. The cost to maintain copies of purchase invoices also was judged to be negligible. Many companies consider it sound business practice to retain these records in any case.

Furthermore, feed manufacturers that intend to manufacture products containing both restricted and nonrestricted materials in the same facility must provide means to avoid commingling or cross-contamination of materials. These feedmills and feed distributors will need to establish clean-out procedures and prepare written documentation of procedures ensuring complete

segregation of restricted and nonrestricted materials. The number of feedmills preparing these procedures include the 1,000 feedmills forecast to expand their facilities and an additional 1,000 feedmills that have adequate capacity without expansion to allow continued purchases of MBM and alternative protein sources. Incremental operating costs for clean-out procedures were estimated, as described above. Because clean-out procedures are already commonplace in the feed industry, however, it was assumed that the industry could readily incorporate this new clean-out requirement. No training costs were estimated for this requirement.

Furthermore, persons responsible for feeding ruminant animals will be required to maintain copies of purchase invoices and labeling for all feeds received and be able to provide them for inspection. The cost of this requirement was judged to be negligible.

FDA is imposing no requirements on facilities that generate offal. Thus animal producers (except for regulatory elements affecting their own animal feeding practices), large and small slaughterers, meat processors, grocery stores, and others will not incur any documentation requirements.

3.3 COMPLIANCE COSTS FOR THE RUMINANT-TO-RUMINANT PROHIBITION

3.3.1 Capital Costs

Under the ruminant prohibition, cattle slaughterers and cattle offal renderers must decide whether to modify their facilities and operations. In most cases, however, the decision is quite clear. All large cattle packer/renderers and large cattle packers slaughter only cattle and have no reason to consider separation. Thus, the separation decision can be considered only by smaller slaughterers, referred to as "locker" plants, that might process both ruminant and nonruminant species, and by the independent renderers, virtually all of whom produce MBM from mixed species, including dead animal stock.

The decision on whether to separate offal is an interdependent one for independent renderers and the locker plants that are their primary clientele. For independent renderers, several factors will make investments in supplemental rendering facilities to allow separate offal processing unattractive. First, most independent renderers are more heavily dependent on cattle than any other

species for their raw materials. The quantity of nonruminant materials collected at most facilities is not sufficient to sustain a modern, continuous-process rendering facility. If they separate their raw materials, they might not have economically viable operations in either ruminant or nonruminant MBM production. Further, primarily because of the declining availability of raw materials, the rendering industry has been shrinking in recent years, particularly among the independent renderers that must consider the separation decision.

Based on these factors and on discussions with industry personnel, it is anticipated that virtually no independent renderers will make investments in new plants and facilities to process both ruminant and nonruminant offal. Thus, renderers of ruminant protein will continue operations largely without change. Because independent renderers will not separate offal, locker plants will have no incentive to separate offal. Independent renderers will accept whatever prices they can obtain for mixed species MBM and charge locker plants higher prices to remove their offal.

This outcome will be modified to the extent that consolidation occurs among independent renderers. Some independent rendering companies operating in the same region will have an incentive to combine operations and run ruminant and nonruminant offal operations in separate facilities. Such consolidations might, however, be subject to review by the U.S. Department of Justice for antitrust reasons. In any case, such consolidations will not generate new investment but only a change in the use of existing facilities. Further, given the uncertainty about whether such consolidations will occur, none have been forecast for this analysis.

Feedmills will also consider facility modifications to allow joint production of feeds for ruminants and nonruminants. At present, many feedmills have only a single storage tank for MBM, and a single production line for mixing and blending MBM, grains, and other feed components. To use both ruminant-derived and nonruminant-derived MBM, these feedmills will have to expand the facility, add a new storage tank for a second type of MBM, and modify their operating practices.

Feedmills are more likely to invest in added MBM capacity the larger the price differential between the two types of MBM. If the restricted (i.e., cannot be sold to ruminants) MBM is much cheaper, competitive pressures in the feed industry will encourage feedmills to offer the lower price protein. Nevertheless, industry contacts indicate that the price differential must be substantial before significant numbers of feedmills will expand their facilities. Resistance to the investments

derives from (a) concerns about the potential for contamination with two types of MBM in the facility, (b) the cost of facility modifications, particularly for the poured concrete feedmill structures that have been constructed in recent years, (c) the existing overcapacity in the feed industry, and (d) the additional operating complications and costs. Accordingly, some feedmill operators have stated that they are very reluctant to make such investments and will instead cease purchases of ruminant MBM in the event of an FDA restriction on its use.

After considering these factors, it was estimated that under the ruminant prohibition, feedmills will not invest in expanded facilities unless the price differential for the two types of MBM is large, such as \$50 per ton or more. Beyond that point, a number of feedmills will make investments. As is discussed later, two market outcomes are considered: a low market impact scenario in which the price differential between restricted and unrestricted MBM is \$25 per ton, and a high market impact scenario in which the price differential is \$100 per ton. No feedmills are assigned capital investment costs under an assumption of the low price differential and 20 percent of the major commercial feedmills were estimated to make capital investments if the price differential is high. None of the more numerous small retail feedmills and feed dealers were assumed to make capital investments. In addition to the feedmills that expand facilities, some feedmills can purchase unrestricted MBM without making a capital investment. Some feedmills serve only nonruminant producers and can convert entirely to the lower priced MBM, assuming their clientele wishes to purchase feed mixes including the restricted MBM, and others have extra available storage capacity. This group was estimated at 20 percent of the major commercial feedmills (1,000 feedmills).

The estimates of feedmill investments are constrained by calculations indicating that with this level of capital investment feedmills will absorb all of the restricted MBM produced.² The average capital cost per feedmill for those making the investment was estimated at \$50,000.³ Table 3-6a presents the annualized incremental capital cost for feedmills.

²Restricted MBM will also be purchased by feedmills that have ample storage bins at the present time and will not need to expand. This was taken into account in the estimates.

³Some large feedmills have extra storage tank capacity at present and will not require significant capital investment to add a second type of MBM. The capital cost estimate is intended to take into account all facilities, including these feedmills.

Feedmills will also need to invest in reformulating their affected feed mixes to remove ruminant MBM from their ruminant feed. With the ruminant prohibition, slightly fewer feed mixes than for the mammalian option, will be reformulated. Table 3-6a and 3-6b describe the costs of reformulating feed mixes.

Feedmills also must reregister any modified ruminant feeds with numerous state agricultural agencies. These costs are also estimated in Table 3-6a and 3-6b. The reregistration costs under the ruminant prohibition also are forecast to be slightly less than those under the mammalian prohibition because slightly fewer products will be affected.

3.3.2 Incremental Operating Costs at Affected Facilities

As described, slaughterers and renderers are expected to continue current operations without change under this option, despite the possible decline in the price of ruminant MBM. They will not incur incremental operating costs.

Feedmills that add a separate tank for ruminant-derived-MBM (under the high market impact scenario) are expected to incur incremental annual operating costs of \$10,000 per year to avoid contamination of the two types of feed (See Table 3-6a; Hershberger, 1996). As previously noted, this estimate is derived from comments made by the National Grain and Feed Association (NGFA), a trade organization representing feedmills, to the FDA docket for this rulemaking. The costs encompass the time needed to run cleanout and flushing procedures between feed batches, as may be appropriate, and to sequence the feed runs according to MBM type. The NGFA estimate was the only available estimate of these incremental operating costs and was accepted for this analysis.

3.3.3 Incremental Transportation Costs

Because slaughtering and rendering processing operations will not be changed, the transportation patterns for offal will not change, and no incremental transportation costs in the processing stage have been estimated. As for the mammalian prohibition, however, incremental transportation costs are likely in marketing of the MBM that is displaced from its current uses. This incremental transportation charge was estimated at \$6.3 million per year for this option, reflecting the per unit incremental cost of \$25 per ton for the approximately 500 million lbs. of material restricted under this option.

Feed marketing and distribution channels will also change as a result of the regulation. An incremental transportation charge of \$5 per ton of MBM displaced was used to capture this effect. This incremental charge is one-half that used for the mammalian prohibition because the choice of alternative sources of protein are not as constrained for this prohibition. The incremental transportation costs for feed purchases is estimated at \$1.3 million per year.

3.3.4 Documentation Costs

Documentation and recordkeeping costs under the ruminant prohibition include the same elements as under the mammalian prohibition but are slightly lower. The difference occurs because fewer products are affected, and fewer feedmills are forecast to need to make labeling changes. An estimated 2,000 feedmills are estimated to prepare cleanout procedures.⁴ Table 3-8 presents the documentation costs for this option.

⁴These procedures are prepared only under the high-market impact scenario, to be introduced in Section 3.7.

3.4 COMPLIANCE COSTS FOR THE PARTIAL RUMINANT PROHIBITION

3.4.1 Capital Costs

Again under the partial ruminant prohibition, slaughterers and renderers must decide whether to separate ruminant offal into restricted and nonrestricted components. The company executives will consider whether the costs of separating offal are less than the loss that will otherwise occur from marketing a lower value MBM product.

It is forecast that cattle packer/renderers will have sufficient incentive to separate restricted from nonrestricted material. By virtue of their size, these operations can economically separate offal and protect the revenue stream from separate rendering of the nonrestricted material. Nevertheless, cattle packer/renderers are not expected to invest in new, expanded rendering facilities at their existing plants to render restricted material separately. Instead, it is anticipated that they will ship restricted material for rendering to one or more existing independent renderers that are willing to accept the material.

To allow separation of restricted material, packer/renderers will incur capital costs to plan, design, and construct facility modifications that will allow separation of restricted material for collection and shipping to separate rendering facilities. Costs for modifications are estimated to average \$332,000 per facility for packer/renderers. The facilities will add chutes to transport restricted material from the kill floor to a new set of conveyors that will route the material to a storage hopper. Due to the pre-existing congestion of conveyors systems below the kill floor, a number of new conveyors will be needed to circumnavigate obstacles and these will consume much of the capital investment. Rendering trucks will then be loaded from the storage hopper. The total capital costs under this regulatory prohibition are presented in Table 3-9. The components of the packer/renderer capital costs are itemized in Table 3-10.

For large cattle packers, locker plants, and independent renderers, the decision on whether to separate offal is influenced by factors not relevant to the packer/renderer case. Large cattle packers and locker plants have an incentive to separate offal only if they can obtain service from a renderer that produces an unrestricted MBM product. But many independent renderers will be unwilling to produce an unrestricted product because to do so will require that they decline both restricted material and farmers dead stock. Combined, the loss of these materials are likely to

lower many plant operating levels by 30 percent or more, making the rendering operations unprofitable.

The economics of offal separation are particularly poor for locker plants. Because of the distances to be traveled by renderer fleets in collecting material from locker plants (some of which are located 150 miles or more from renderers), separate pickups for restricted and nonrestricted material are infeasible. Thus, renderers will need to modify their existing trucks to accommodate separate water-tight compartments for the two types of offal. (Designs for such trucks have not been developed.) Upon picking up separated offal, the renderer truck will return to the plant, offload one type of offal, and then transfer the second type to another truck for transport to a second rendering facility. Further, regardless of transportation issues, locker plant operators contacted for this study expressed unwillingness to separate offal and concern about the logistics of separation for their operation. It was concluded that locker plants will not separate offal.

Between the packer/renderers, who will have adequate incentive to separate offal, and the locker plants that will not, are large cattle packers. Some cattle packers are expected to separate offal in order to protect the revenue stream they receive from supplying nonrestricted material to renderers. Those that separate are expected to be among the largest cattle packers and, therefore, those that can best take advantage of economies of scale in capital investments for separation, and in transportation of offal. Other good candidates for separation are those that are in closest proximity to independent renderers. It was forecast that 50 percent of large cattle packers will separate offal. This estimate presumes that, despite the reluctance of independent renderers to produce MBM from nonrestricted material, some large packers and independent renderers can coordinate their activities to mutual benefit to separate offal and produce such an MBM product. These independent renderers are not expected to build new facilities, but to disengage from some of their current raw material suppliers (such as locker plants and farmers with dead stock), and use their existing facilities to produce MBM from other than restricted material.

The large cattle packers that separate offal are expected to invest approximately \$153,500 per facility. These facilities are expected to take a comparatively low-tech approach to separation. Cutters on the slaughter line will remove the components of restricted material and drop them into mobile cart tubs that will then be periodically dumped into a conveyance system and fed into a storage hopper. The hopper will be located so that its contents can be dumped into renderers' trucks.

The forecast for feedmills is structured in the same manner as that made for the ruminant prohibition. Under a low market impact scenario in which the price differential between MBM types is \$25 per ton, no feedmills are forecast to invest in expanded facilities to handle a second type of MBM. Under a high market impact scenario, some feedmills, estimated for this prohibition at 5 percent, are forecast to make capital investments. The percentage making the investments is lower for the partial ruminant prohibition in recognition of the fact that there will be far less restricted protein manufactured under this regulatory prohibition. Thus, the number of feedmills that expand to purchase this material is constrained by amount of material that will be available. The incremental feedmill costs under this prohibition are presented in Table 3-6a.

Also, as under the ruminant prohibition, some feedmills that service nonruminant producers almost exclusively are expected to purchase the lower price MBM made from restricted material. These feedmills will not incur incremental capital costs.

Feedmills will also need to invest in reformulating their affected feed mixes. As under the previous options, the reformulation process is necessitated as feedmills remove restricted material from feed mixes intended for ruminants. Considerably less reformulation occurs under this option, however, because many feedmills will substitute restricted mixed species MBM (which contains the high-risk material) with unrestricted beef MBM, a change which will not require reformulation. Tables 3-6a and 3-6b describe the costs of reformulating feed mixes.

Feedmills also must reregister any modified ruminant feeds with numerous state agricultural agencies. These costs are also estimated in Table 3-6a and 3-6b.

3.4.2 Incremental Operating Costs at Affected Facilities

Cattle packer/renderers and large cattle packers will incur increased operating costs to separate restricted material from other ruminant offal (see Table 3-11). Additional personnel will be needed on the kill floor of slaughterhouses to remove the restricted material and to deposit the items into the correct chutes or cart tubs. The highest cost is expected to involve separation of the

distal ileum because of the time needed to identify and remove that portion of the intestine.⁵ In total it is estimated that three additional workers per line will be needed to separate the restricted material. The additional separation equipment, such as the conveyor systems, will increase plant operating costs also, due to the increased maintenance and utility requirements. (Details for the cost estimate are shown in Table 3-10).

For independent renderers, no change in plant operating costs are estimated. As noted, most independent renderers are expected to designate themselves as handlers of restricted material. Some of these will receive restricted material from packer/renderers, actually increasing their throughput and lowering per unit plant operating costs. Others are expected to handle separated nonrestricted offal from large cattle packers. It is assumed that such renderers will be receiving offal from several large packing facilities or else their throughput will decline too far to allow continued profitable operation. The net effect on plant operating costs of the possible realignments with raw material suppliers among independent renderers was assumed to be zero and no incremental costs were estimated.

Feedmills will incur costs to ensure that the restricted and nonrestricted feeds will not be commingled. As for the ruminant prohibition, the change in operating costs per year is estimated at \$10,000.

One possible category of costs, landfill disposal costs, has not been estimated. Landfilling of some ruminant offal could occur, such as where the realignment of independent renderers leaves some locker plants without rendering service or with pickup charges that are too high, and where local landfills will accept animal offal. Nevertheless, it was forecast that rendering services will remain viable despite the substantial economic changes that will likely occur in the industry, and that it will be less costly for locker plant operators to have their offal rendered than to pay for landfilling of the material.

3.4.3 Incremental Transportation Costs

⁵As noted previously, FDA has not defined its final technical requirements for separating restricted material under this option and the logistics of separation and the quantity of restricted material to be removed remains subject to uncertainty.

Incremental transportation costs will be incurred because restricted material will now be transported from packer/renderers and some large cattle packers to independent renderers. Under current operations, separate transportation of this portion of the offal is not needed. The incremental transportation costs (see Table 3-10 for cost detail and Table 3-12) are estimated in relation to the normal transportation costs, estimated at \$0.015 to \$0.02 per pound of raw material, for the independent rendering industry. The transportation costs for restricted material shipments from packer/renderers and large cattle packers are estimated to be less than the industry average, however, because of the comparatively large volume of material per shipment.

Incremental transportation costs will also be generated in marketing restricted MBM. The incremental transportation costs were based on the amount of mixed species MBM (approximately 115,000 tons) that is displaced from cattle feed. Using the estimated incremental transportation cost of \$25 per ton, the total transportation cost was calculated at \$2.9 million per year.

Finally, incremental transportation costs will be incurred to obtain alternative protein sources for cattle feed. These charges were estimated at \$5 per ton of mixed species MBM replaced with a total incremental cost of \$577,000 per year.

3.4.4 Documentation Costs

Table 3-8 presents the documentation costs under the partial ruminant prohibition. Under this option, large cattle packers will incur documentation costs, specifically to prepare offal separation procedures and to train staff in how to separate restricted material from other cattle tissue. Additionally, 1,250 feedmills are expected to prepare cleanout procedures, including 250 mills that expand to allow handling of new feed ingredients and 1,000 mills that do not need to expand in order to accommodate both restricted and unrestricted MBM. Overall, documentation costs are smaller under this option and are less than one-half those of the mammalian or ruminant prohibitions.

3.5 COMPLIANCE COSTS FOR THE OPTION RESTRICTING USE OF PROTEIN DERIVED FROM SHEEP (INCLUDING LAMB), GOATS, DEER, ELK, AND MINK

3.5.1 Capital Costs

Under the sheep/mink prohibition, the prohibited materials now used for ruminant feed are virtually certain to be excluded from independent rendering processes that produce mixed species MBM, such as that used in cattle feed. Sheep, lamb, and goat will, however, continue to be rendered for sale to nonruminant markets, such as pet food. Other sheep/mink producers will be forced to arrange disposal themselves or through their slaughterers. No capital investments in slaughtering or rendering facilities are forecast in response to this regulatory alternative.

3.5.2 Incremental Operating Costs and Disposal Costs for Affected Facilities

Because no changes are expected in slaughtering or rendering plants, no incremental plant operating costs are forecast. Some increased operating costs in the form of disposal charges are expected for animal producers, as addressed below.

The exclusion of sheep/mink offal from independent rendering facilities will force animal producers to dispose of the offal themselves. Thus, slaughterers are expected either to return offal to animal producers for disposal, or arrange disposal themselves, passing on all disposal costs to animal producers. Table 3-13 shows the total disposal costs forecast for the animal producers affected by this regulatory option. The total quantity of material to be disposed is constrained to the extent to which offal from sheep/mink is now being processed for pet food uses. Much sheep and goat offal is also currently being returned to animal producers or landfilled from locker plants because of the refusal of most renderers to accept the material.

Disposal costs were estimated at \$150 per ton for animal offal, with this average intended to summarize a range of disposal circumstances. Besides the normal variation of disposal costs by location and region, some animal producers will dispose of materials on their own land and incur minimal disposal costs. Other animal producers, however, might encounter difficulty in arranging for disposal because of the high moisture content and potential for odor problems from disposal of offal. These producers might incur costs higher than \$150 per ton. The disposal cost per ton estimate is assumed also to cover transportation costs to disposal sites, including transportation to relatively remote sites in some circumstances.

3.5.3 Incremental Transportation Costs

The incremental transportation costs generated to dispose of animal offal are discussed in the section above. Otherwise, the exclusion of offal from the sheep/mink alternative will lower rendering industry throughput, thereby potentially decreasing the efficiency of the renderer fleet operations. This change is so small, however, that no incremental transportation costs for the rendering fleets are estimated.

3.5.4 Documentation Costs

A small number of renderers are expected to prepare cleanout procedures so that they can continue to perform separate rendering of mixed species MBM and lamb MBM. No other documentation requirements apply under this option.

3.6 COMPLIANCE COSTS FOR THE OPTION RESTRICTING USE OF PROTEIN DERIVED FROM SHEEP (INCLUDING LAMB), AND GOATS

3.6.1 Capital Costs

As for the sheep/mink option, the prohibited sheep and goat material will be excluded from the independent renderers that produce mixed species MBM. Since the majority of this material is excluded from such facilities at the present time, only very small impacts are expected. No capital cost investments at slaughtering or rendering plants are foreseen in response to this option.

3.6.2 Incremental Operating Costs and Disposal Costs for Affected Facilities

No incremental plant operating costs are foreseen for slaughtering or rendering plants. Incremental disposal costs are foreseen, however, reflecting the exclusion of some sheep and goat tissue from rendering. As for the sheep/mink option, incremental disposal costs are calculated in Table 3-13, based on an assumed unit disposal cost of \$150 per ton.

3.6.3 Incremental Transportation Costs

No incremental transportation costs are foreseen.

3.6.4 Documentation Costs

A small number of renderers are expected to prepare cleanout procedures so that they can continue to perform separate rendering of mixed species MBM and lamb MBM. No other documentation requirements apply under this option.

3.7 FORECASTS OF THE NEW MARKET EQUILIBRIUMS FOR MBM

The first three regulatory options (mammalian through partial ruminant) will produce new equilibriums of supply and demand in the mixed species MBM market. Because marketing of mixed species MBM to the ruminant feed market will be restricted, the new long-run equilibrium price under these regulatory options will be below the current average price.

The last two regulatory options, the sheep/mink and the sheep and goat, are forecast to have a negligible impact on the mixed species MBM market. Most sheep and lamb offal is now either rendered separately for pet food uses or is excluded from rendering due to rendering industry concerns about BSE transmission. A regulation mandating the exclusion of this material from mixed species MBM is forecast to have no discernible impact on MBM prices. The exclusion of these materials, however, will reduce industry revenues in correspondence with the limited extent to which the materials are currently used in mixed species MBM production. A small decline in industry revenue, reflecting the termination of any processing of these materials for mixed species MBM, is forecast for these final two options.

Rendering industry executives have noted that in most market conditions mixed species MBM (which includes cattle and other species, as produced by independent renderers) sells at an average price premium of approximately \$25 per ton relative to soybean-based products.⁶ The current market price is approximately \$230 per ton. MBM contains calcium, phosphorus, and other nutrients that are lacking in the principal alternative source of protein, soybean meal. When MBM is not used, therefore, animal feeds must be supplemented with other sources of these nutrients. Nevertheless, the existing market relationships are likely to change under the first three regulatory options.

⁶Some industry personnel estimated the common range of the price premium for MBM over soybean meal to be \$10 to \$45 per ton.

3.7.1 Supply Assumptions

Based on discussions with industry contacts concerning the change in market equilibrium prices and output, it is judged that the short-term supply curve for mixed species MBM is quite inelastic. Most renderers will continue to produce MBM even at sharply lower market prices.

Two factors are particularly relevant:

- # MBM is produced jointly with tallow, which is not directly affected by any of the possible regulatory prohibitions. Tallow sales contribute one-half or more of renderer revenues.
- # Slaughterers and animal producers require rendering services as a means of disposal for offal or dead animals. Renderers have considerable ability, therefore, to pass increased costs upstream to their clients. In the short run, these clients will presumably pay renderers for offal disposal as long as rendering is cheaper than the alternatives, such as landfilling (where allowed).

Over the long term, the supply curve is more elastic, representing some adjustment by livestock producers to lower prices for their animals due to lower offal value.

3.7.2 Demand Response in Nonruminant Markets

The market impact of the regulatory prohibition will be determined by the price at which nonruminant feed consumers are willing to absorb mixed species MBM after it is excluded from ruminant feed. The FDA prohibition will curtail sales that currently represent approximately 10 percent of the mixed species MBM market. Thus 10 percent of the mixed species MBM will have to be sold to other markets or discarded. This section discusses how responsive nonruminant markets are likely to be to possible MBM price declines.

Pet Food Manufacturing. Discussions with renderers and pet food manufacturers indicated uncertain prospects for increases in pet food use of restricted MBM. Several factors are relevant.

First, pet food manufacturers have established nutrition formulae that incorporate specified amounts of rendered protein. These manufacturers are generally using all of the MBM protein that their formulae can accommodate and the potential for increased use appears limited. While a

regulation-induced lowering of MBM prices will encourage pet food manufacturers to adjust their formulae, they historically have made such changes only after testing trials and careful consideration of impacts on their retail markets.

Also, pet food manufacturers are sensitive to public perception (and to competitors' marketing claims) and, therefore, might actually decrease use of restricted MBM in the event of an FDA prohibition. A representative of the Pet Food Institute, an industry trade association, indicated that manufacturers were monitoring the TSE issue but generally had not decided what actions they would take (LaMotte, 1996). One renderer stated that some pet food manufacturers have already started to substitute other materials for ruminant protein. Other observers, however, forecast that the industry demand for MBM would increase in response to a price decline caused by FDA regulation. Thus, the effect of an FDA regulation on MBM demand from the pet food sector is uncertain.

Poultry Producers. Poultry producers also are sensitive to public perception and their willingness to increase purchases of mammalian or ruminant MBM at discounted prices is uncertain. Name-brand chicken producers, like Tyson or Perdue, are likely to be especially attentive to public perception. Generic chicken producers might be more willing to buy restricted MBM because they do not have a premium associated with their name in the market. Nevertheless, many generic producers sell to name-brand franchises like McDonalds that will be sensitive to public perception.

Although chicken producers overall represent a large market for MBM, many chicken producers are not currently using MBM. For example, most chicken producers in the Southeast are too far removed from the ruminant-producing Midwest for mixed species MBM to be a cost-effective protein source in feed. Nevertheless, if the price for MBM were to fall sufficiently (and public perception is not a severe constraint), some of these chicken producers could increase their MBM purchases.

Among those who are now buying mixed species MBM, the demand response of chicken producers (and that of other animal producers) is constrained by the nutritional requirements of their animals. Chicken producers will be more responsive to a price decline up to the point where they have fulfilled their chicken's nutritional requirements for animal protein. Beyond that point, the demand response from these chicken producers will be limited.

Swine Producers. Industry personnel contacted for this analysis predicted either that swine producers will remain a viable market for restricted MBM or that they, like poultry producers, will shift nutritional mixes to nonrestricted ingredients. Use of MBM has traditionally been low among the many swine producers that are on-farm grinders and mixers of feed. Most of these operations are not near a nutritional limit for this animal protein, but have avoided MBM in the past for various reasons including concerns about potential salmonella contamination. The on-farm mixers and grinders have the capability to absorb increased quantities of MBM and might do so if the price falls sufficiently. Recent scientific evidence also indicates that salmonella transfer to swine from rendered MBM is not a danger (Bisplinghoff, 1996). Nevertheless, given the possibility of an adverse public reaction, as well as the historical caution of this sector toward use of mixed species MBM, the demand response from swine producers remains uncertain.

Export Markets. Export markets for mixed species MBM may have difficulty absorbing a much larger quantity of restricted protein. Many foreign purchasers are sensitive to U.S. determinations of risk and might choose not to purchase a product that is restricted in the United States. Particularly important overseas purchasers include the foreign suppliers to U.S. food producers, such as McDonalds and Kentucky Fried Chicken. These companies might be directed to match the feeding practices of their U.S. counterparts in order to maintain a consistent-tasting product, regardless of place of origin. Thus, these foreign entities might act as extensions of U.S. producers, and if U.S. producers substitute away from mammalian or ruminant MBM, they will also. Alternatively, MBM exporters could increase efforts to sell to overseas nonruminant feed markets.

Other Alternative Markets. No other alternative markets have been identified that will absorb increased quantities of restricted mixed species MBM. For example, use of material as fertilizer has been investigated, but this use is not expected to represent a major source of demand.

In summary, it is uncertain whether most nonruminant sectors will increase their purchases in light of FDA regulatory action. Pet food manufacturers, chicken and hog producers, export markets, and other alternative markets were judged to be vulnerable to potential public concerns about BSE. The possibility exists, therefore, that any one of these sectors could reduce rather than increase demand for MBM in light of regulatory action. The nonruminant industry as a whole, however, is expected to increase purchases of MBM in response to the reduced prices.

The extent of the price decline for restricted MBM will be largely determined by the public reaction to an FDA regulation. But that public reaction remains unpredictable. Two scenarios, reflecting a low-market impact and a high-market impact, were defined to capture the range of the possible decline in the market-clearing price for mixed species MBM. As previously noted, the price decline scenarios apply only for the first three regulatory options, i.e., those that restrict marketing of cattle-derived protein. The low-market impact scenario was defined with a price decline of \$25 per ton and the high-impact scenario with a price decline of \$100 per ton. Under the high-market impact scenario, it is presumed that the public reaction is sufficiently adverse that nonruminant animal producers and other potential MBM consumers need considerable economic incentive (i.e., a \$100 per ton price differential relative to current market conditions) to increase purchases of the restricted MBM and allow the market to clear. The price decline is assumed to hold indefinitely.

Looking across the three regulatory options, the quantity of restricted MBM is largest in the mammalian prohibition and considerably smaller in the partial ruminant prohibition, suggesting that a larger price decline will occur in the former, other factors being equal. Under the partial ruminant prohibition, however, the restricted MBM product might be perceived as unacceptably risky by a larger share of potential purchasers. Data were not sufficient, therefore, to forecast differential price declines for restricted MBM under these regulatory options.

3.8 TOTAL COSTS AND IMPACTS

Table 3-14 presents a summary of costs incurred and market-driven revenue shifts for all regulatory options. As explained, to capture the possible range of public reaction and the related market shifts, low and high market impact scenarios were estimated for the first three regulatory scenarios in which the price of the restricted mixed species MBM falls by \$25 per ton and \$100 per ton. At the \$25 per ton price decline, the loss in commercial value of the restricted MBM product is an estimated \$76.4 million per year under the mammalian prohibition, \$63.2 million per year under the ruminant prohibition, and \$28.8 million per year under the partial ruminant prohibition. At the \$100 per ton price decline, the loss in commercial value is an estimated \$305.6 million per year under the mammalian prohibition, \$252.8 million per year under the ruminant prohibition, and \$115.4 million per year under the partial ruminant prohibition. The estimated loss of commercial value under the partial ruminant prohibition reflects the assumption that these tissues can be efficiently separated; FDA has not specified, however, its technical requirements for removal and separation of these tissues during slaughtering.

The revenue declines under the sheep/mink and sheep and goat prohibitions have been calculated in terms of the full loss to industry revenues of the cessation of any current rendering for mixed species MBM of the restricted materials. The loss is independent of any change to MBM prices. The loss to industry revenues has been set at \$500 per ton, reflecting both the loss of mixed species MBM but also the associated tallow from the rendering process. The total revenue loss under the sheep/mink is estimated at \$4.2 million per year and under the sheep and goat option at \$0.1 million per year. The comparatively small revenue losses occur because most existing rendering of these materials for pet food uses will continue.

Regarding the costs incurred by industry in response to the FDA prohibitions:

- # Under the mammalian prohibition, total costs are estimated at \$31.6 million per year under either the low or high market impact scenarios.
- # Under the ruminant prohibition, total costs vary from \$10.2 million per year in the low market impact scenario to \$27.6 million per year in the high market impact scenario. The difference is due to the forecast that only in the high market impact scenario will some feedmills expand capacity.
- # Under the partial ruminant prohibition, total costs are \$23.5 million per year in the low market impact scenario and \$27.9 million per year in the high market impact scenario. Because fewer feedmills are forecast to invest in expanded facilities under

this option, the difference between the two market scenarios is smaller than for the ruminant prohibition.

- # Under the sheep/mink and sheep and goat prohibitions, total costs, which consist almost entirely of disposal costs, are estimated at \$5.1 million and \$0.2 million, respectively.

The totals include the estimated costs for facilities to prepare and maintain procedures. These documentation costs vary from \$1.9 million for the mammalian prohibition to approximately \$1,000 under the sheep/mink and sheep and goat prohibitions where only a few facilities will document their procedures.

Between the mammalian and ruminant options, much of the cost difference reflects the different forecasts of feedmill investments. Under the mammalian prohibition, a number of feedmills are expected to expand their facilities regardless of the drop in mixed species MBM prices. Under the ruminant prohibition, feedmills will not invest in expanded facilities unless the price decline for mixed species MBM is substantial. The forecast of feedmill investments is similar for the partial ruminant prohibition. The sheep/mink and sheep and goat prohibitions affect far fewer operations and generate much smaller compliance costs. Tables 3-15 through 3-24 summarize the per-establishment and industry costs for each regulatory option.

Table 3-25 summarizes the market revenue impacts experienced by renderers due to the decline in the price of MBM under the regulatory options. The table also distributes the revenue declines between packer/renderers, large, and small independent renderers. The revenue declines across the first three regulatory options for large and small independent renderers vary only slightly because they are not expected to separate materials by species. As a result their principal product, mixed species MBM, will be restricted in its use under all three regulatory options. The revenue decline per small independent rendering establishment under the first three regulatory options is estimated at approximately \$138,000 per year under a \$25 per ton revenue decline and at approximately \$550,000 per year under a \$100 per ton decline. Under the sheep/mink and sheep and goat options, the revenue decline for small renderers is estimated at approximately \$46,000 and \$1,600 respectively.

3.9 ECONOMIC IMPACTS ON IMPACTED SECTORS OF THE ECONOMY

3.9.1 Cattle and Hog Packer/Renderers

In general, packer/renderers are in an economically advantageous position relative to other affected groups due to economies of scale in operation, vertical integration from packing through meat processing, and the absence of transportation expenses for the collection of the raw material for rendering. They, therefore, have substantial cost advantages over nonintegrated slaughterers and independent renderers for withstanding the effects of restrictions on use of cattle protein. This sector will not be affected by the sheep/mink or sheep and goat options.

The projected decline in market value per ton for ruminant MBM depends on the market response and could vary from approximately \$1 to \$5 per head of cattle under either the mammalian or ruminant prohibitions. Under the partial ruminant prohibition, however, the loss per head of cattle will be less to the extent that separation of offal allows a greater return to the rendering process. Based on an assumed distribution of packing activities across industry, a \$25 to \$100 per ton decline in revenue for ruminant MBM implies a per packer/renderer establishment revenue decline in MBM sales of \$472,000 to \$1.9 million under the mammalian prohibition, \$335,000 to \$1.3 million under the ruminant prohibition, and approximately \$9,000 to \$37,000 under the partial ruminant prohibition. Under the partial ruminant prohibition, cattle packer/renderers are also expected to incur additional costs, adding 3 workers to the line to separate offal.

While the loss of MBM revenues and the additional labor costs could be significant, packer/renderers and other slaughterers as a group have considerable ability to pass costs on to their cattle suppliers. In the short run, the supply of slaughter-weight cattle is highly inelastic. Furthermore, the demand for beef products may be elastic due to competition from poultry and other red meats. Thus, any reduction in the slaughter value will be mirrored in a commensurate reduction in the price of cattle.

The slaughtering industry is highly concentrated, although recent studies have concluded that any resultant market power is not reflected in the slaughter markets for cattle (USDA, 1996c). In a competitive market, major participants like packer/renderers, all of whom will face similar revenue losses and cost increases due to FDA actions, will be able to pass through costs to animal producers in the form of lower prices paid per head of cattle.

Based on the likelihood that increased costs are passed upstream to cattle producers, packer/renderers will avoid most of the impacts generated by the loss of revenues or increased costs under the first three regulatory options. Packer/renderers will incur some impacts in the long

run to the extent that cattle production decreases due to regulatory actions. The long-run adjustment in the size of the cattle herd will ultimately result in a somewhat smaller herd than would have been obtained in the absence of any FDA action. The new equilibrium cattle price will be slightly higher than that resulting from the short-run price adjustment.

3.9.2 Independent Renderers

Under the first three regulatory options, independent renderers also will seek to avoid a decline in revenues for MBM by passing costs upstream to their raw material suppliers, including large packers (those without rendering facilities), locker plants, farmers with dead livestock, and other sources (e.g., grocery stores). Unlike packer/renderers, independent renderers do not own the raw material suppliers.

The decline in market value of MBM (\$25 to \$100 per ton) under the first three options will lower revenues for independent renderers. As has been noted, because most independent renderers do not operate separate rendering lines, they will be processing a mixture of restricted and nonrestricted offal, even under the partial ruminant prohibition. Thus, the revenue decline is similar under all three options. Across these three regulatory options, the overall annual revenue decline is estimated at approximately \$200,000 to \$950,000 per year for each large rendering establishment and to \$138,000 to \$550,000 per year for each small rendering establishment for the \$25 and \$100 per ton price declines.

Renderers will respond to the revenue reductions by renegotiating pickup charges (or payments made) to their raw materials suppliers. The number of raw material pickups made by the independent renderers' fleets varies widely with each renderer's circumstance and location. In general, however, it is likely that most renderer fleets make at least twenty thousand stops per year.⁷ A hypothetical facility making 20,000 pickups per year would have to increase charges (or reduce payments) by \$27.50 per stop in order to recover the maximum forecasted revenue loss of \$550,000 estimated for small renderers under the \$100 per ton revenue decline.

⁷This estimate was calculated assuming 10 route trucks making an average of 10 stops per day, 5 days per week, 50 weeks per year. This fleet would make 26,000 stops per year. The smallest operations, however, might have fewer than 10 trucks and an estimate of 20,000 stops was used for this calculation.

The ability of renderers to pass on cost increases to their offal suppliers is substantial. All competing renderers will face the same market changes and regulatory prohibition, so standard industry pickup charges will adjust upward. Furthermore, the amount of raw material generated is determined by the number of animals slaughtered and, at least in the short run, is not likely to be influenced by the pickup price or charge.

Nevertheless, the increase in pickup charges will reduce the amount of raw material from some sources going to renderers. First, ranchers and farmers will have considerably more incentive to bury dead stock on their own land. Some renderers contacted for this study commented that past increases in pickup charges had caused significant reductions in dead stock rendering. Ranchers with large range areas are particularly likely to begin disposing of animals on their own land. Second, the reduced payments for offal reduce the commercial value of animals and cause a long-run reduction in the number of animals produced, as is discussed below.

Based on the ability of the industry to pass through much of its revenue loss to slaughterers under the first three regulatory options, most independent renderers are forecast to weather the industry transition. Those renderers that are most dependent upon ranchers dead stock for their raw materials will be vulnerable to failure, however. There are an estimated 20 to 25 rendering establishments in this group and some closures appear likely. Furthermore, if the price decline for MBM is at the upper end of the range described (i.e., \$50 to \$100 per ton), additional failures among renderers due to regulatory impacts are possible. In that situation, renderers will be passing substantial new costs on to their customers, particularly their most remotely located customers and those with the least material for rendering. With such steep price declines, independent renderers that have poor profitability for whatever reason (such as large debt service or substantial local competition) will be vulnerable to failure.

Under the final two regulatory options, renderers will incur impacts only to the extent they are rendering sheep and goat offal for mixed species MBM production. Since very few renderers are processing significant quantities of these materials for mixed species MBM, the overall industry revenue loss is quite small and is estimated here at \$4.2 million or \$0.1 million per year.

3.9.3 Other Large Cattle and Hog Packers

Large packers that do not render offal on site lack the market advantages of the packer/renderers. For example: (1) these plants are less likely to be vertically integrated into meat processing, and (2) they do not control the rendering process for their offal. Under the first three regulatory options, the value of the offal generated by the packers will fall as renderers seek to increase the pickup fees or charges for offal disposal. Under the partial ruminant prohibition, some packers are expected to separate and take advantage of the premium for unrestricted offal. Their ability to do this will depend on the proximity of renders that will handle both unrestricted and restricted materials. In some cases, the packer will have to either invest in rendering facilities or make some other arrangements in order to avoid the decline in the value of their offal.

Nevertheless, an important response of large cattle packers to the first three regulatory options will be to pay less for livestock. With all packers and packer/renderers facing similar regulation-induced changes, prices paid at livestock auctions will decline, lowering returns to livestock producers.

3.9.4 Locker Plants

The smaller slaughterhouses, termed locker plants, consist of very small, family-owned businesses, often with fewer than a dozen employees. The number of locker plants has been decreasing for many years as red meat consumption has dropped and meat purchases are concentrated increasingly at supermarkets. Based on comments made to the FDA docket and discussions with locker plant operators, locker plant profit margins appear to be quite small and some plants are barely viable.

Based on the increased renderer pickup charge derived above of up to \$27.50 per pickup, a typical locker plants will face increased costs of as much as \$2,750 per year under the partial ruminant option.⁸ Most locker plants have some ability to pass increased costs on to their rancher and farmer clientele, most of whom have limited on-farm capability for slaughtering. Locker

⁸Locker plants normally kill animals twice per week, necessitating, therefore, two render pickups per week. Therefore, \$27.50 per stop times 2 stops per week times 50 weeks per year produces an incremental operating cost of \$2,750.

plants are also more conveniently located to the ranchers and farmers than the large packing plants with which they compete. Further, some cost passthrough to farmers will occur due to the general market decline in the value of cattle and hogs. Nevertheless, locker plants contacted for this study expressed concern about their ability to increase prices, even while citing a decline in number of locker plants operating in their area. Presumably many of the remaining locker plants continue to face competition from the nearest large packer.

Available information is not sufficient to characterize more exactly the cost passthrough prospects for locker plants. Given the tenuous economic status of many plants before regulation, however, some business closures among locker plants are likely, particularly if the MBM price decline is at the upper end of the range being considered.

Under the sheep/mink and sheep and goat options, impacts on locker plants are much smaller because very little animal production is affected. Some small locker plants that slaughter sheep and goat and do not currently return sheep or goat offal to the producer will face some economic impacts or will need to pass incremental costs to their customers. Few renderers are currently processing adult sheep and lamb.

Numerous locker plants slaughter deer during hunting season and a few also slaughter deer, and elk for commercial deer-producing operations. Under the sheep/mink option, locker plants are expected to increase slaughtering charges for deer hunters that do not dress deer themselves and for other commercial animal producers. (Many deer hunters dress the deer and bury the deer offal in the forest.) The increased charges are expected to ameliorate the effects of increased disposal costs on renderers although the charges are likely also to lower demand for deer slaughtering services from locker plants.

3.9.5 Feedmills

Under the mammalian prohibition, feedmills will consider investments in expanded facilities in order to continue servicing ruminant and nonruminant animal producers. Feedmills could suffer economic distress if they (1) invest in expanded facilities but experience a poor return on investment or, (2) do not expand their facility and experience a decline in sales because they can no longer service both ruminant and nonruminant producers.

Among feedmills that cannot recover a capital investment in expanded facilities, but who are concerned about a loss of sales volume, some might be able to adapt lower cost capital investments or make other adjustments that will allow them to maintain ruminant and nonruminant animal producing customers. For example, instead of investing in an additional raw material storage tank, some feedmills might be able to use small capacity bins or purchase bags of blended animal protein to maintain the variety of their feed mixes.

Feedmill operators contacted for this study did not forecast feedmill closures due to impacts from the first three regulatory impacts. For the most part, feedmill operators can pass increased feed costs on to their customers. For the final two regulatory options, impacts on feedmill operators will be negligible.

3.9.6 Cattle Producers

The reduction in the value of cattle offal under the first three regulatory options will be reflected in the short term by a decline in the average slaughter price for cattle. As has been mentioned, the \$1 to \$5 per head decline under the mammalian or ruminant prohibitions represent approximately 0.1 to 0.7 percent of the average slaughter prices for cattle of approximately \$700 per head. (Current prices have been below this level due to exceptionally high numbers of cattle being brought to slaughter.) In the short run, before any supply response by cattle producers occurs, this change represents the decline in income from cattle production for livestock producers.

The overall percentage decline in prices under the partial ruminant prohibition will be less, to the extent that offal is separated. Individual packers who do not separate, however, will face declines in slaughter value equivalent to that under the ruminant prohibition. Their loss in the value of offal they generate will not be entirely compensated by the decline in cattle prices.

The first three regulatory options will also increase cattle feed prices, with the increase dependent upon the regional availability and price of alternative protein sources. The smallest increase is expected for the partial ruminant prohibition because feedmills will retain most of their current alternatives for providing protein to cattle, i.e., they can still provide ruminant-derived MBM if it does not include the restricted materials. Under the ruminant and mammalian prohibitions, the use of MBM is further restricted and or eliminated entirely. Feedmills will seek

alternative sources of bypass protein including corn gluten meal, fish meal, blood meal, feather meal, and/or blends of these materials. This change in the price for feed inputs will affect all purchasers of these inputs, including livestock producers who do not currently use MBM. The final two regulatory options are not expected to affect feed prices.

The increase in feed prices under the first three options will worsen the current poor cattle market conditions in some regions. According to one estimate, the feed price increase could be approximately 1 percent, i.e., roughly a \$3 increase in feed prices that are currently in the high \$200s.⁹ In some regions, however, such as California with its substantial dairy cattle herd, very little MBM is currently used and price impacts should be considerably smaller. Feed prices are currently as much as 40 to 50 percent above average levels. In the cattle market of summer 1996, high feed prices and low cattle slaughter prices have led to some liquidation of herds.

In response to these market conditions, a gradual decline in the inventory of cattle normally occurs over a period of 3 to 5 years. An immediate price decline in cattle prices and the increase in feed prices due to the first three regulatory options will cause a slightly greater reduction in herd sizes. In the long run, the reduction in average cattle prices will lead producers to maintain slightly smaller beef cattle herds. Based on a national beef cattle herd size of approximately 100 million head, and assuming a unitary elasticity, the reduction in income due to the loss of offal value under the mammalian or ruminant prohibitions will lead to a reduction in the average total herd of between 140,000 and 700,000 animals. The increase in feed prices will encourage still further herd reductions, although this effect was not quantified.

3.9.7 Hog Producers

Hog producers will lose income under the mammalian prohibition, but should see an increase in income under the ruminant or partial ruminant prohibitions. Under the mammalian prohibition, hog producers will see a loss of income of \$0.20 to \$0.80 per head due to the drop under the market scenarios in the price of hog offal. Under the other regulatory options, hog offal should increase in value as demand for hog-derived protein (to substitute for mixed species MBM)

⁹Derived from Lenard, 1996. The estimate is based on the assumption that soybean meal (with supplemental minerals) is substituted for mixed species MBM. The increase in cattle feed prices will be smaller in those regions where cattle are not currently fed MBM and, therefore, there is no increase in local demand for alternative protein sources.

increases. Hog feed is not directly affected by the FDA regulatory options, although hog feed prices could fall due to decreases in the price of mixed species MBM.

3.9.8 Sheep, Lamb, and Goat Producers

Minimal regulatory impacts are anticipated for sheep, lamb, and goat producers under all regulatory options. So much sheep, lamb, and goat offal is now excluded from mixed species MBM that the impacts associated with BSE controls have already been felt by these producers. Sheep, lamb, and goat offal is prohibited from ruminant feed under all of the regulatory options.

Due to BSE concerns, renderers have been consistently requiring their locker plants to exclude sheep offal from the raw materials sent to rendering. The locker plants return the sheep offal to sheep producers and ask them to arrange for disposal themselves. The sheep producers generally bury or landfill the material (Rogers, 1996). Goat offal is also often excluded.

Regarding lamb and goat offal, producers experiences differ depending on whether they are located in the Eastern or Western United States. The lamb offal generated from large lamb slaughterers, all of whom are located in Western states, is productively used in pet food. Similarly, goat production is concentrated most heavily in Texas and much goat offal is used in pet food production. Lamb and goat protein has desirable characteristics for pet food and sells for premium prices in this use, which will not be restricted under FDA action. Eastern lamb producers, however, are too far from pet food manufacturers to be used in that market. Most Eastern lamb are slaughtered in locker plants. Further, because locker plants (and their renderers) are concerned about their ability to distinguish adult sheep from lamb, lamb offal is often also returned to the producer for disposal. Only a small share of Eastern lamb offal is being rendered. Thus, the renderers voluntary ban on rendering of adult sheep often resembles a ban on rendering of lamb and sheep in the Eastern United States.

Under the proposed regulatory options, only those sheep, lamb, and goat producers in the Eastern United States whose offal is currently being rendered will experience a small decline in income. Many other Eastern producers, perhaps a majority, already must handle the offal for disposal. Most Western lamb and goat producers will not be affected.

Under the first three regulatory options, the loss of income for some lamb production will be offset by possible gains for other sheep and lamb producers. Where producers currently must dispose of adult sheep and lamb offal themselves, under the first two regulatory options (and perhaps the first three) they are likely to renew rendering of their offal. It is anticipated that this material will be combined with cattle and other restricted protein and used in manufacturing of mixed species MBM. Renderers will no longer have a reason to exclude sheep and lamb offal if cattle offal is also a restricted material.

3.9.9 Deer Producers

Under all regulatory options, the value of deer brought to slaughter, like the value of other ruminants, will decline. This will reduce income for the small number of commercial deer producers, and also increase the slaughtering charges levied by locker plants to recreational deer hunters.

Based on an estimated total commercial deer slaughter of 9,000 deer and an aggregate deer offal generation of 225,000 lbs per year, the aggregate loss to the commercial deer farmers is less than \$3,000 under the high market impact scenarios defined for the first three options.¹⁰ Under the final two options, deer offal would be excluded from mixed species rendering processes, forcing deer producers to dispose of their offal themselves. The costs for disposal of this material represent the majority of costs estimated for the sheep/mink and sheep and goat options.¹¹

Demand for venison has been growing, suggesting that deer producers might be able to pass some of their cost increase onto customers. But because the venison market is dominated by imports of New Zealand venison, deer farmers probably have little ability to raise prices. Thus, deer farmers will incur a small decline in income.

¹⁰Calculated assuming a 25 percent yield of MBM from the deer offal and a \$100/ton decline in value of the offal.

¹¹These estimates do not consider the possibility that one or more independent renderers in heavy deer-hunting areas could begin to manufacture a predominantly deer-based MBM product for sale for poultry or other rations. These renderers might establish a seasonal deer offal rendering service. In that case, the revenue losses would be smaller than forecast here, and a few additional renderers would need to establish appropriate documentation and labeling for a restricted products.

For deer hunters, economic impacts are of relatively little importance given the recreational nature of the activity.

3.9.10 Bison Producers

Under the first three regulatory options, bison producers will incur approximately the same decline in value per head as cattle producers. (Bison protein is not regulated under the final two regulatory options.) The average bison is only slightly larger than a cow and generates roughly the same amount of offal. Under the maximum forecasted decline in MBM value, therefore, bison producers will also receive approximately \$5 less per head.

Specialized bison slaughterers will incur increased charges for offal pickups by independent renderers. The relatively few bison slaughterers will pass this cost to bison producers. Some bison slaughterers are integrated with the bison production operation.

Bison meat garners an unusually high price (\$5 to \$7 per pound) and the premium bison cuts occupy a niche in the meat market. As a result, bison producers have some potential to pass their cost increase on to consumers.

3.9.11 Mink Producers

Mink offal is now rendered with other species and will decline in value under the first four regulatory options. Under the first three options, independent renderers are expected to increase their charges for handling mink offal and mink producers will experience a loss of income. Under the fourth regulatory option (sheep/mink), mink offal is expected to be excluded from rendering, forcing producers to seek their own methods of disposal. Under the final regulatory option, mink producers are not affected.

A representative of the mink producers trade association indicated that some negative economic outcomes could result for small mink producers under the first four options (Dennis, 1996). Small mink producers (a group representing perhaps the majority of the 446 mink farms) produce only pelts and offal, whereas larger producers might also harvest mink oil and often run integrated slaughtering, marketing, and distribution networks. Small mink producers already have

some difficulty obtaining renderer service due to the small quantities handled and the infrequency of the mink slaughter, which occurs annually. Based on discussions between the industry trade association and industry members, smaller producers judged that after the regulation (and assuming a significant decline in the value of the restricted MBM) some mink producers might not be able to obtain renderer service at all, as is forecast for the fourth option. Also if the renderers charge goes up substantially, it could reduce the small producers already unstable and modest income.

Several mitigating factors might reduce the impacts on these operations. On-farm disposal of offal might be a possibility, especially for small producers. Also, for most of the small farmers affected, mink production is one of several agricultural activities. Therefore, even a decline in mink revenues is unlikely to cause a failure of these small farm businesses.

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